STATE OF IDAHO

DEPARTMENT OF ENVIRONMENTAL QUALITY

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Dirk Kempthorne, Governor
Toni Hardesty, Director

June 29, 2005

Robert L. Geddes
Monsanto Company
PO Box 816
Soda Springs, Idaho 83276

Re: 2005 Phase II Supplemental SI Groundwater Work Plan Approval
P4 Production, Inc (Monsanto) Sites' Investigations

This letter transmits Lead Agency approval of the *Final 2005 Phase II Supplemental SI Groundwater Work Plan* prepared by Montgomery Watson Harza in June 2005. The plan was conceptually described to the agency representatives during our meeting in March 2005 and some work was conducted during the past month. It appears the interagency comments contained in our May 23, 2005 letter were adequately addressed in P4's subsequent response letter and final document.

We remind P4 Production/MWH to continue with the 5-day Agency notifications prior to mobilizing for any fieldwork; to continue interagency coordination on the July/August attenuation forum to be facilitated by Dr. Dale Ralston; and to submit a draft Phase 2B work plan describing proposed monitoring well locations, details, and rationale for Departmentreview and approval prior to well installations.

If you have any questions or comments, please do not hesitate to call me.

Respectfully,

Richard L. Clegg, P.E.
On-Scene Coordinator

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Final 2005 Phase II Supplemental SI Groundwater Work Plan

1.0 INTRODUCTION

The *2005 Phase II Supplemental SI Work* Plan presented herein is an addendum to the *P_4 Production Southeast Idaho Mine-Specific Selenium Program 2004 Comprehensive Site Investigation Final Work Plans for Ballard, Henry and Enoch Valley mines (MWH, March 2004).* The Phase II investigation is in accordance with the requirements of the AOC signed by P_4 Production, IDEQ, USEPA, and USFS. The work plan supports the comprehensive mine-specific SI.

This addendum presents the proposed Phase II investigation activities based on results and conclusions derived from Phase I activities. Phase II activities will focus on filling data gaps required to identify and monitor flow systems associated with potential contaminant sources. The results from the Phase II investigation will be used to prepare a technical memorandum describing the details of the proposed monitoring well installation program for the three mines.

2.0 PHASE I GROUNDWATER INVESTIGATION

In 2004, Phase I of the geology and groundwater investigation was conducted in an effort to identify, characterize, and monitor groundwater flow systems associated with the potential sources at the P_4 Production mines. Phase I activities were focussed on accumulating, evaluating, and summarizing existing geologic and hydrogeologic information, and also included water sampling of existing wells, seeps, and springs. Analytical data results from Phase I activities were presented in the Phase I Site Investigation Summary Report, submitted in April 2005. The following tasks were completed during Phase I:

- Review of available hydrogeologic information
  The review included gathering geologic maps and cross-sections, existing mine maps, and verbal accounts from mine geologists with regard to faults and water bearing zones encountered during mining activities. In addition, a review of available hydrogeologic reports and literature sources was completed.

- Mine and domestic/agricultural well survey and sampling
  A well inventory was conducted to identify all existing mine wells and domestic/agricultural wells within an approximately 3-mile radius of the mines. Information was obtained from borelogs in the Idaho Department of Water Resources (IDWR) records regarding the construction of the wells and geologic units encountered. Existing mine wells and selected wells identified in the well survey were sampled.

- Spring and seep survey and sampling

  Several natural springs and seeps were identified in the vicinity of the three mines during the field survey conducted in May 2004. Samples were collected from all springs and seeps, excluding those that were dry, in Spring and Fall 2004. Locations and analytical data were presented in the Phase I Site Investigation Summary Report (April 2005).

- Spring flow characterization

  Due to a low spring runoff event, analysis of recession of flow from the springs was not completed during the Phase I investigation. The recession of flow analysis may be completed as part of the Phase II activities pending a reasonable winter recharge event.

- Update of conceptual hydrogeologic site model

  The conceptual hydrogeologic site model focused on identifying probable flow paths, flow systems, and identifying data gaps. The model was revised and updated with information derived through implementation of the Phase I tasks.

3.0 PHASE II GROUNDWATER INVESTIGATION SCOPE

- Aerial Mapping of Ballard Mine
- Focussed Investigation of Existing Wells
  - Existing well log survey and search
  - Downhole camera projection of existing wells
- Existing Well Sampling and Groundwater Level Monitoring
  - Water level measurements
  - Sample existing mine wells
- Revision of the Conceptual Hydrogeologic Site Model
  - Geochemical typing of wells, seeps, and springs
  - Evaluation of groundwater systems at the three mines
- Preparation of a Technical Memorandum for Monitoring Well Installations
- Develop Selenium Attenuation Conceptual Model

4.0 SITE INVESTIGATION TASKS

4.1 PHASE II GROUNDWATER INVESTIGATION TASKS

4.1.1 SUBTASK 3b-PHASE II GROUNDWATER INVESTIGATION

Activity 3b-1—Aerial Mapping of Ballard Mine

Mine personnel are conducting aerial mapping of Ballard Mine as part of the overall site investigation. This information will be used to update our site maps, including the aerial extent of the pits and waste rock piles.

Activity 3b-2—Focused Investigation of Existing Wells

- **Existing Well Log Compilation and Search -** A search was conducted during Phase I activities to compile all sources of information relevant to the groundwater investigation. This effort was discussed in Activity 3a-1"Review Available Hydrogeologic Information" in Section 4.3.1 of the SI Final Work Plans for Enoch Valley, Henry, and Ballard Mines (MWH, March 2004). Sources of information reviewed have included published and unpublished geologic and hydrogeologic reports, geologic maps and cross-sections, existing mine maps and drilling reports, and any other relevant information. P4 Production has used this information to develop and refine the conceptual hydrogeologic site model. However, additional site-specific information, particularly concerning the construction of wells AW008, MW003, MW004, PW006, and PW023, is necessary to further refine the model. This continued effort to obtain information would also include searching for geologic cross section maps for the North Henry Mine particularly near the Little Blackfoot River.

- Well MW005, located southwest of well MW004 at Henry Mine, was discovered in May 2005. The well location coordinates and description will be added to the well inventory. This well will be included in the following Phase II Investigation tasks: well log search, downhole camera investigation, and groundwater sampling.

- **Downhole Camera Investigation: MW001, MW002, MW003, MW005, PW023, AW008 -** It is not known if some existing wells are viable groundwater monitoring wells because their construction has not been confirmed. In order to utilize sample data from these wells, it is important to determine the condition of the wells, screened intervals, and which water bearing units are intercepted. It is also important to understand any cross contamination risks associated with well construction across more than one geologic unit. A downhole camera will be used to conduct this investigation.

Activity 3b-3—Existing Well Sampling and Groundwater Level Monitoring

- **Water Level Measurements -** Groundwater levels will be monitored in MW001 and MW002 wells at Ballard Mine. These data will provide information to predict characteristics of the flow systems, evaluate seasonal variances. This information will also be used to update the conceptual hydrogeological site model. Data loggers may be used to complete this task. The data loggers may be installed in different wells for a period of approximately one month each.

- **Sample Existing Mine Wells -** The following wells will be sampled in spring and fall 2005 for the purpose of groundwater monitoring and determining new monitoring well locations: Enoch Valley Mine wells PW006 and PW019; Henry Mine wells MW003, MW004, MW005, PW022, and PW023 and Ballard Mine wells MW001, MW002, and AW008. Monitoring well, MW003, will be sampled only if an existing well log or the downhole camera investigation confirms the well is in a reasonable location for groundwater monitoring.

  Samples will be analyzed in the laboratory for the parameters listed in Table 1 *Groundwater Analytes.* Sample analysis rationale is provided in section 6.3.7 "Groundwater Analyses" of the Final Program Field Sampling Plan (MWH, April 2004). Data for the following analytes: aluminum, manganese, iron, nitrate and nitrite will be obtained to further explore the groundwater geochemistry at the mines. If possible, low flow sampling procedures will be implemented.

TABLE 1
GROUNDWATER ANALYTES

Parameter Monitoring Sample	Method	EDL	Reporting Units	Holding Time
alkalinity, total	SM2320B	2	mg/L	14 days
aluminum, dissolved	M200.7 ICP	0.03	mg/L	180 days
cadmium, dissolved	M200.8 ICP/MS	0.0001	mg/L	180 days
calcium, dissolved	M200.7 ICP	0.2	mg/L	180 days
chloride, dissolved	M300.0	0.5	mg/L	28 days
chromium, dissolved	M200.8 ICP/MS	0.00010	mg/L	180 days
iron, dissolved	M200.7 ICP	0.01	mg/L	180 days
ferrous iron, dissolved	SM3500-FeD	0.01	mg/L	-
ferric iron, dissolved	Calculation	0.01	mg/L	-
magnesium, dissolved	M200.7 ICP	0.2	mg/L	180 days
manganese, dissolved	M200.8 ICP/MS	0.0005	mg/L	180 days
nickel, dissolved	M200.8 ICP/MS	0.0006	mg/L	180 days
nitrate and nitrite, dissolved	M 353.2	0.02	mg/L	28 days
potassium, dissolved	M200.7 ICP	0.3	mg/L	180 days
selenium, dissolved	SM3114 B, AA-Hydride	0.001	mg/L	180 days
sodium, dissolved	M200.7 ICP	0.3	mg/L	180 days
sulfate, dissolved	M300.0	0.5	mg/L	28 days
vanadium, dissolved	M200.8 ICP/MS	0.0002	mg/L	180 days
zinc, dissolved	M200.8 ICP/MS	0.0020	mg/L	180 days

Note:
"Monitoring Sample" refers to monitoring wells, springs, seeps, and other groundwater point monitoring locations.
EDL – Estimated Detection Limit
Methods are for media (non-blank) samples. Blanks will be analyzed for total results when analyte methods allow.

Activity 3b-4—Revise Conceptual Hydrogeologic Site Model

The conceptual hydrogeologic site model will be revised and updated based on the information that has been gathered during Phase I and Phase II of this investigation. Specific areas or tasks that will be targeted will include:

- **Geochemical typing of water from wells, seeps, and springs -** An analysis of the major ion concentrations from existing groundwater analytical data will be performed to evaluate whether water-typing may be used to characterize/identify groundwater flow systems in the vicinity of the mines.

- **Groundwater System Evaluation**
  - **Enoch Valley Mine -** Further evaluation of the shallow groundwater system at Enoch Valley Mine will be conducted using updated geologic mapping and various existing well logs in the area. Specifically, the well logs will be reviewed to determine the thicknesses of the alluvium/Dinwoody Formation in the area, as well as approximate water levels and zones of saturated thickness in the units. This evaluation will be used to target locations, approximate depth, and approximate screened interval of a new monitoring well in this area.

  - **Henry Mine -** Further evaluation of the shallow groundwater system at Henry Mine will be conducted using updated geologic mapping and various existing well logs in the area. In addition, information collected from existing wells (PW023 and MW003) through use of the downhole camera will contribute to this evaluation. This evaluation will be used to target locations, approximate depth, and approximate screened interval of a new monitoring well in this area.

  - **Ballard Mine -** Further evaluation of the shallow and deep groundwater systems at Ballard Mine will be conducted using updated geologic mapping. This information will be used to confirm the conceptual model of compartmentalized flow systems that appear to dominate this area. In addition, information collected from existing well logs (MW001, MW002 and AW008), as well as through use of the downhole camera, will contribute to this evaluation. This evaluation will be used to target locations, approximate depth, and approximate screened interval of a new monitoring well in this area.

Activity 3b-5—Preparation of a Technical Memorandum for Monitoring Well Installations

New monitoring wells will be installed at the mine sites to address data gaps related to identified flow paths associated with potential contaminant sources. The new monitoring wells will be sampled, following installation; using standard monitoring well sampling protocol. Data from the new wells will also be used to confirm critical components of the updated conceptual hydrogeologic site model. The locations, approximate depths, screened intervals, and geologic units targeted will be detailed in a Technical Memorandum provided to the agencies for review and approval prior to implementation. Based on preliminary analyses, monitoring wells may be installed at the following locations:

- **Enoch Valley Mine -** South or west of the Enoch Valley Mine South Waste Rock Pile, screened in the alluvium/Dinwoody Formation to target the shallow groundwater flow path from the waste rock pile in this area.

- **Henry Mine -** Near existing well MW003 and/or near PW023 to target shallow flow from waste rock piles in these areas.

- **Ballard Mine -** South of West Ballard Pit in the Wells formation to monitor groundwater flow in the vicinity of the waste rock within this pit.

Activity 3b-6—Develop Selenium Attenuation Conceptual Model

A conceptual model will be developed to identify possible selenium attenuation mechanisms (physical, chemical and/or biological) in surface water and in the shallow and deep aquifers. A literature review will be conducted to compile information, regarding both what is known and what is not known, regarding selenium attenuation. A panel of experts will be assembled and may consist of mining professionals, MWH personnel, and research scientists from universities. The panel will provide knowledge of selenium biogeochemistry, soil and water chemistry, microbiology, geology and other relevant fields. The panel may also be utilized in the future to provide the knowledge necessary to develop laboratory and/or field tests used to refine or validate the model. Dr. Dale Ralston, University of Idaho, has agreed to lead the panel and coordinate teleconference and videoconference forums. An effort to integrate Agency representatives and other company and technical representatives has been initiated.

5.0 PHASE II GROUNWATER INVESTIGATION SCHEDULE

June

- Sample Enoch Valley Mine wells PW006 and PW019; Henry Mine wells MW003 (pending results of the downhole camera investigation), MW004, MW005, PW022, and PW023 and Ballard Mine wells MW001, MW002, and AW008
- Groundwater level monitoring
- Downhole camera investigation
- Well log compilation and search
- Update conceptual hydrogeologic model

July

- Submit draft Technical Memorandum identifying the locations, approximate depths, screened intervals, and geologic units targeted by new monitoring wells
- Conduct literature review and assemble expert panel to develop the selenium attenuation conceptual model

August

- Respond to Technical Memorandum comments and finalize document

September

- Install and sample monitoring wells
- Sample Enoch Valley Mine wells PW006 and PW019; Henry Mine wells MW003 (pending results of the downhole camera investigation), MW004, MW005, PW022, and PW023 and Ballard Mine wells MW001, MW002, and AW008